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(54) Data communication

(57) A method for transmitting/receiving wireless data and an apparatus therefor using the quality of application service and features of a coder/decoder (CODEC) of application layer are provided. The method for transmitting/receiving wireless data includes the steps of: determining information related to the application data service as a catalogue; adding header information of

each layer referring to the catalogue determined in the above step and error detecting codes to the application data; deciphering a header if data errors are detected by the error detecting codes added to the data during the reception, and transmitting the data to the upper ranking layer according to the quality of service if the deciphered value of the header belongs to the catalogue determined in the above step.

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Description

[0001] The present invention relates to a method of transmitting data and a method of receiving data packets comprising header data and payload data, the method comprising passing received payload data up a protocol stack.

[0002] Generally, a transmitting terminal of a cdma telecommunication system transmits data through an application layer, a radio link protocol layer, an MUX sub layer, and a physical layer. That is, the application layer is a CODEC-related standard such as H.324M, H323, and T.120. In the physical layer 130 channel coding, PN spreading and modulation are performed together with air interface functions.

[0003] A radio link protocol (RLP) layer includes a signaling portion, and converts a payload of the application layer transmitted by a radio channel into an input format for the physical layer. The RLP layer has an RLP per application layer of N numbers, and is connected to the physical layer through the MUX sub layer. The MUX sub layer adaptively multiplexes an RLP received from the RLP layer into a protocol data unit (PDU).

[0004] The cdma telecommunication system checks for errors in the physical layer. Here, data which is determined to have errors in the physical layer by a cyclic redundancy code (CRC) information cannot be transmitted to the upper layer if the MUX sub layer does not include a CRC field. Also, if errors are included in the MUX sub layer including the CRC field, data is not transmitted to the upper layer. Therefore, the amount of overall data which is transmitted from the transmitting portion to the receiving portion is decreased by performing an error check of the CRC field.

[0005] A data transmission method according to the present invention is characterised by adding a processing control code to a header for said data, said processing control code being obtained in dependence on the service to which the data relates.

[0006] A method of receiving data packets according to the present invention is characterised by, in the event of the detection of an error in a received packet in a first protocol stack layer, extracting a predetermined element of the packet's header and passing the received payload or a default payload up said protocol stack in dependence on whether said predetermined element belongs to a predetermined list of processing control codes.

[0007] According to the present Invention, there is provided a method for transmitting/receiving wireless data, wherein the method for transmitting/receiving includes the steps of:

determining information about the application data service as a catalogue;
adding the header information of each layer and error detecting codes referring to the determined catalogue in the above step to the application data; and

5 deciphering a header if data errors are detected by the error detecting codes added to the data during reception, and transmitting data to the upper layer according the quality of service if the deciphered value of the header belongs to the determined catalogue in the above step.

[0008] According to the present invention, there is provided a method for transmitting wireless data, wherein in the method for transmitting wireless data includes the steps of:

10 determining information about the application data service as a catalogue;
determining the application data as the payload, and adding header information about the data with reference to the determined catalogue; and
adding the error detecting codes to the payload formed in the above step, and performing a channel coding.

[0009] According to the present invention, there is provided a method for receiving wireless data in the wireless data system including information about the application data service as a catalogue, wherein the method for receiving wireless data includes the steps of:

15 determining data errors in each layer by the error detecting codes added to the data after channel-decoding the received data;
deciphering header information in each layer when the data errors are detected;
transmitting data to the upper layer according to the quality of service if the header information deciphered in each layer in the above step belongs to the catalogue; and
decoding the data transmitted in the above step.

[0010] According to the present invention, there is provided an apparatus for transmitting and/or receiving wireless data, wherein the apparatus for transmitting/receiving wireless data includes:

20 means for transmitting the application data to which the header information referring to a catalogue of each protocol per layer and the error detecting codes are added, after determining information about the application data service as a catalogue;
and
means for receiving which deciphers header if data errors are detected by the error detecting codes of the application data received from the means for transmitting, and decoding the data according to the quality of service if the deciphered value belongs to the determined catalogue.

[0011] An embodiment of the present invention will now be described, by way of example, with reference to

the accompanying drawings, in which:

Figure 1 is an overall structural diagram showing an apparatus for transmitting/receiving wireless data according to the present invention;

Figure 2 illustrates a protocol format formed by passing through each layer of the transmitting terminal of Figure 1;

Figure 3 is a flowchart showing a method for transmitting wireless data according to the present invention; and

Figure 4 is a flowchart showing a method for receiving wireless data according to the present invention.

[0012] Referring to Figure 1, a transmitting terminal 1 and a receiving terminal 2 each include a service catalogue relating to quality of service (QoS) factor such as the delay time of data transmitted and an error generation probability of data which will be used.

[0013] The transmitting terminal 1 conveys data through an application layer 110, an RLP layer 120, a MUX sub layer 130, and a physical layer 140, and includes a first format catalogue 122 and a second format catalogue 132 which catalogue information related to the data service used for transmitting to the RLP layer 120 and the MUX sub layer 130.

[0014] The receiving terminal 2 or a repeater conveys received data up through the protocol stack from the physical layer 180, through the MUX sub layer 170 and the RLP layer 160, to the application layer 150, and compares header information of received data with values in the a format catalogue 172 and a second format catalogue 162 which catalogue information about the data service in the MUX sub layer 170 and the RLP layer 160.

[0015] Referring to Figure 2, (a) is the protocol format of the application layer 110. (b) is the protocol format of the RLP layer 120 comprising a RLP header and the payload and a CRC added for protecting the RLP header information. (c) is the protocol format of the MUX sub layer 130 comprising an MUX header and the payload and an CRC is optionally added to the payload. (d) is the protocol format of the physical layer 140 comprising a physical layer header and the payload and a CRC added to the payload.

[0016] Referring to Figure 3, for transmission, information related to the data service is first determined from the first format catalogue 122, the second format catalogue 132, and a service catalogue (not shown) (step 310). For example, the payload size of the RLP is included in the first format catalogue 122, a service index which designates the application data multiplexed in the MUX sub layer is included in the second format catalogue 132, and a QoS parameter, such as a delay time of data which will be transmitted or an error generation probability of data, is included in the service catalogue (not shown).

[0017] Next, data is generated in the application layer 110 and transmitted to the lower ranking RLP layer 120

(step 320).

[0018] Next, the data received in the application layer 110 is formed into the payload in the RLP layer 120, and transmitted to the MUX sub layer 130 with header information added to the data (step 330). Here, information about the RLP from the first format catalogue is included in the header information, and also a field for checking errors can be inserted.

[0019] Next, in the MUX sub layer 130, the service index which designates the application data of the data received from the RLP layer 120 is added as the header information, and transmitted to the physical layer 140 (step 340). Here, a field for checking errors can be inserted in the header for protecting the header information. Then, separate error correction can be added for the header and the payload, error correction can be added for the whole packet or no error correction can be added.

[0020] Next, in the physical layer 140, a physical layer header and a CRC are added to the data received in the MUX sub layer 130, and channel coded and transmitted to the receiving terminal through an antenna (step 350).

[0021] Referring to Figure 4, before any data is transmitted, the receiving terminal includes a first format catalogue 172 and a second format catalogue 162 which are identical to those of the transmitting terminal, and also includes a service catalogue (not shown) determining items about the data service received in the transmitting terminal.

[0022] In the physical layer 180, the received data packets are channel-decoded to obtain the header, the payload, and the CRC information (step 410). In the physical layer 180, a value detected from the data size and the header information, and the data errors detected by the CRC check are transmitted to the MUX sub layer 170 with the data.

[0023] Next, in the MUX sub layer 170, it is determined whether there are errors in the data from the CRC information conveyed from the lower ranking physical layer 180 (step 420).

[0024] Here, in the MUX sub layer 170, if it is determined that there are no errors in the received data, the data is transmitted to the RLP layer 160, and if it is determined that there is an error, the MUX header information of the received data is deciphered (steps 430, 440). Here, the parameters determined in the first format catalogue 172 and the service catalogue are applied as a standard of judgement in order to determine whether the data is transmitted to the RLP layer 160 according to the quality of service or the decoder of the application layer.

[0025] Next, in the MUX sub layer 170, if the deciphered header information is included in the value stored in the first format catalogue 172, the data is transmitted to the RLP layer 160 according to the quality of service determined in the service catalogue in the beginning (steps 450, 460).

[0026] Next, the RLP header information is deci-

phered in the RLP layer 160, and if the deciphered header information corresponds to the value determined in the second format catalogue 162 which the deciphered header information itself includes, the data is transmitted to the application layer 150, according to the quality of service determined in the service catalogue in the beginning, regardless of the errors of the payload.

[0027] Next, the data received in the application layer 150 is decoded as video or audio data by the decoder (step 470).

[0028] Each layer signals null data to the above layer if the deciphered header information does not exist in each catalogue (step 480).

[0029] The present invention can check the header information or not according to the kind of the application layer service determined in the service catalogue before the data is transmitted/received for the first time. That is, if the used service cannot decode bit errors of the payload, or if the quality of service (QoS) wanted by a customer cannot use data having bit errors, the data is conveyed to the upper ranking layer through the CRC check on the entire data. Here, the quality of service must be satisfied by re-transmitting the data having the errors, and thereby, a real time for transmitting the data can be delayed.

[0030] If the bit errors of the payload can be sufficiently decoded, and the quality of service desired by a customer is real time transmission of data, data having no errors in the header is transmitted to the upper ranking layer even though there are CRC errors in the entire data.

[0031] Also, except this, the present invention determines the type of service used in the service catalogue and the support of the decoder, and can form various types. That is, dividing the case that the error checking function is added to the header information and the case that an error correcting function is also added to the same, the error correcting function is used rather than the error checking function if a little time can be delayed rather than the exact real time.

[0032] The method for transmitting data using this type of service and the support of the decoder can be determined through signaling during connection to a radio terminal to the repeater in the beginning, and through the service index added to the header field of the MUX sub layer in the transmitting layer used now.

The decoder of the application layer can receive data errors determined in each layer in the signaling method.

[0033] The preferred embodiments of the present invention can be composed as a program executed in a computer. From media used for the computer, it can be executed in a general-purpose digital computer which operates the program. The media includes magnetic storing media (for example: an ROM, a floppy disc, a hard disc and so on), optical reading media (for example: CD-ROM, DVD and so on). The code may also be in the form of a data signal (for example: a transmission through the Internet). Also, recording media which a

computer can read may be distributed in a computer system connected by a network, and codes which a computer can read in a distributed method can be stored and executed.

5 [0034] According to the present invention, contrary to the conventional method, in that data is not transmitted uniformly to the upper layer if it is determined that there are errors through the error check of the entire data, data belonging to the determined information catalogue is transmitted regardless of the error of the payload, so that the real-time and stable transmission/reception of data is possible according to the quality of service used or decoding method of application layer.

15 Claims

20 1. A method of transmitting data characterised by adding a processing control code to a header for said data, said processing control code being obtained in dependence on the service to which the data relates.

25 2. A method of receiving data packets comprising header data and payload data, the method comprising passing received payload data up a protocol stack, characterised by, in the event of the detection of an error in a received packet in a first protocol stack layer, extracting a predetermined element of the packet's header and passing the received payload or a default payload up said protocol stack in dependence on whether said predetermined element belongs to a predetermined list of processing control codes.

30 3. A method for transmitting and receiving wireless data comprises the steps of:

35 40 determining information related to an application data service as a catalogue; adding header information referred to the determined catalogue in the above step and error detecting codes to an application data; and deciphering the header when data errors are detected by the error detecting codes added to the application data during the receiving, and transmitting the application data to the upper ranking layer according to the quality of service if the deciphered value of the header belongs to the determined catalogue in the above step.

45 4. A method for transmitting wireless data comprising the steps of:

50 55 determining information related to an application data service as a catalogue; determining the application data as a payload, and adding header information about the data,

referring to the determined catalogue in the above step; and
adding error detecting codes to the payload formed in the above step, and performing channel-coding.

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5. A method for receiving wireless data in a wireless data system including information related to an application data service as a catalogue comprising the steps of:

determining data errors in each layer by error detecting codes added to the data after channel-decoding the received data;
deciphering header information in each layer when data errors are detected in the above step;
transmitting data to the upper rank layer according to the quality of service if the header information deciphered in each layer in the above step belongs to the catalogue; and
decoding the data transmitted in the above step.

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13. The method of claim 11, wherein the predetermined standard of judgement is decided by the possibility of an error correction determined in the header fields.

14. An apparatus for transmitting and/or receiving wireless data comprising:

transmitting means for determining information related to an application data service as a catalogue, and adding header information which refer to a catalogue of each protocol per layer and error detecting codes to the application data, and transmitting it; and
receiving means for deciphering a header if data errors are detected by error detecting codes of the application data received from the transmitting means, and decoding the data according to the quality of service if the deciphered value belongs to the determined catalogue.

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6. The method of claims 3 or 4, wherein the error detecting codes are added in a physical layer.

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7. The method of claims 3 through 5, the catalogue is previously determined during the early data transmission/reception, including data information related to RLP and MUX sub layers.

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8. The method of claims 3 through 5, wherein the catalogue is previously determined during early transmission/reception of the data including information related to the quality of service.

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9. The method of claim 8, wherein the information related to the quality of service is a delay time value of the transmitted data or an error generation probability value of the transmitted data.

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10. The method of claim 3 or 5, further comprising a step of signaling null data to the upper ranking layer, if the header information deciphered in each layer does not exist in the catalogue.

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11. The method of claim 3 or 5, further comprising a step of applying a predetermined standard of judgement according to the quality of service or the decoder of the application layer, when the data is transmitted to the upper ranking layer.

55

12. The method of claim 11, wherein the predetermined standard of judgement is decided, referring to CRC information calculated in a physical layer, header fields of each layer, and a data service catalogue determined in the beginning.

FIG. 1

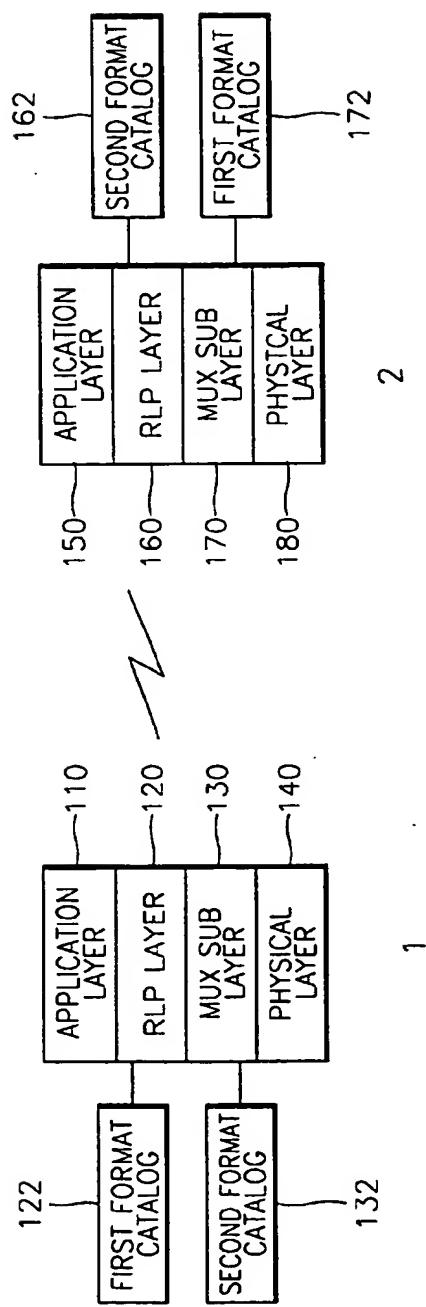


FIG. 2

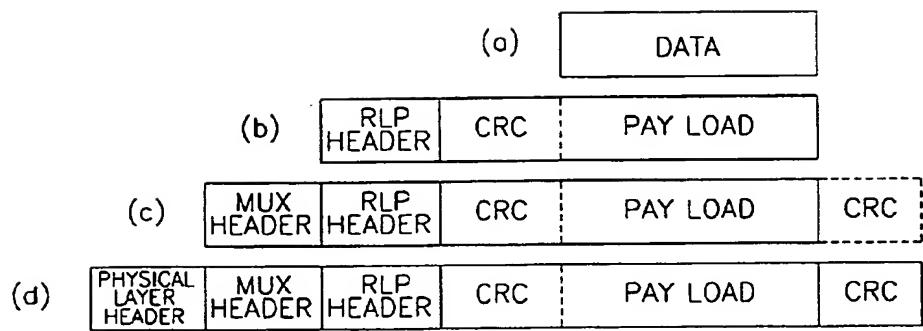


FIG. 3

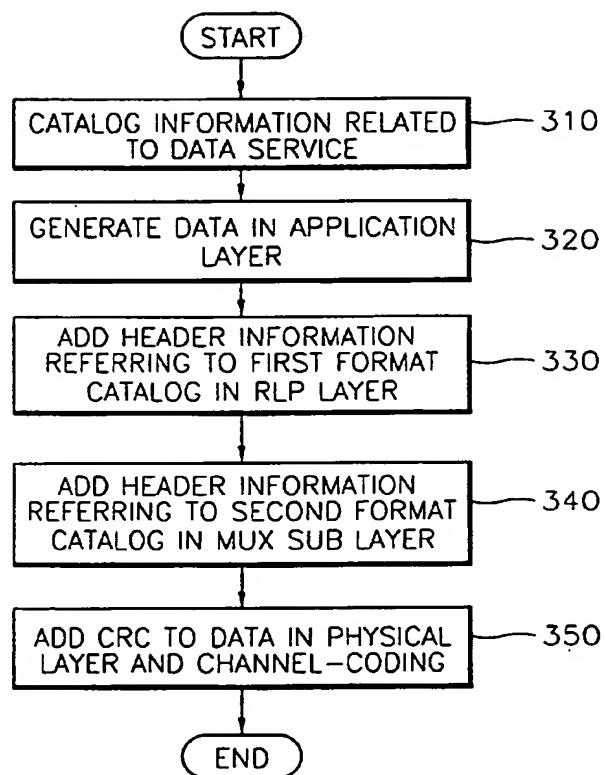
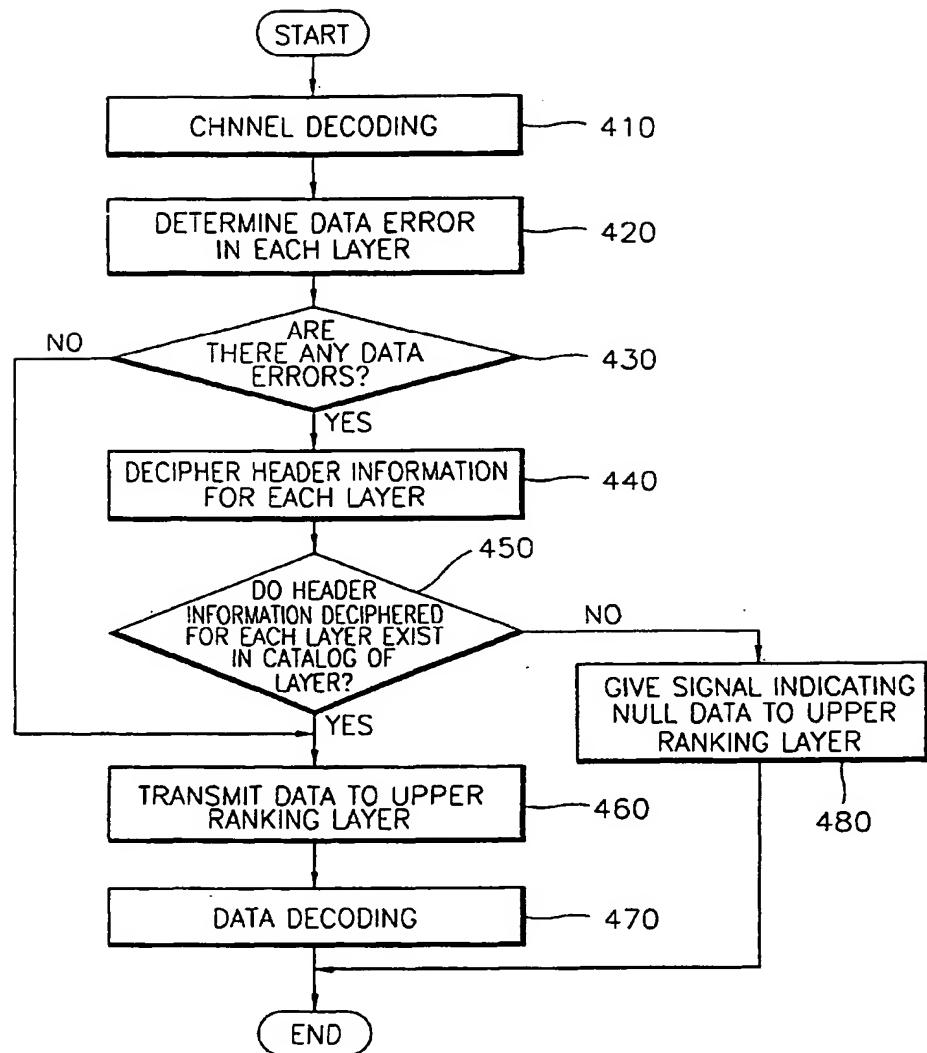


FIG. 4



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